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IC adds full-duplex RS-485 operation

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The simple RS-485 repeater (**Fig 1**) provides full-duplex communications—simultaneous transmitting and receiving—with only two ICs. Its balanced and differential data lines battle high-noise environments and drive long lines. Single-ended RS-232C schemes cannot equal this circuit's performance.

TABLE 1—COMPONENTS NEEDED FOR DIFFERENT DATA RATES

Data rates (bytes/sec)	IC_2	IC_3	R_1	R_2	R_3	R_4	R_5	R_6
2.5M	MAX1480A	MAX485	200	200	360	3k	360	200
250k	MAX1480B	MAX483	200	510	3k	2.2k	3k	200

The RS-485 standard allows for bidirectional, multipoint, party-line communications at data rates up to 10 Mbps (150 kbytes/sec) and line lengths to 1200m. To achieve data rates up to 2.5 Mbytes/sec, substitute the components in **Table 1**.

IC_1, a half-duplex interface, includes transceivers, optocouplers, a power driver, and a transformer. The transformer couples power across the device's isolation barrier from its logic (nonisolated) side to its isolated side.

IC_2, powered by the isolated V_{CC}, upgrades the half-duplex operation of IC_1 to full duplex by using IC_1's dedicated optocouplers. You must tie IC_2's pin 3 low to disable IC_1's driver and leave pin 4 floating. The driver outputs of IC_1 and IC_2 exhibit high impedance when D_E is low; bringing D_E high enables the outputs to function as line drivers.

Any TTL/CMOS logic family can drive IC_1's digital inputs through a series resistor. With the aid of resistor pullups, the outputs can drive such loads as well. IC_1's isolated outputs meet all RS-485 specs. (DI #1613) EDN

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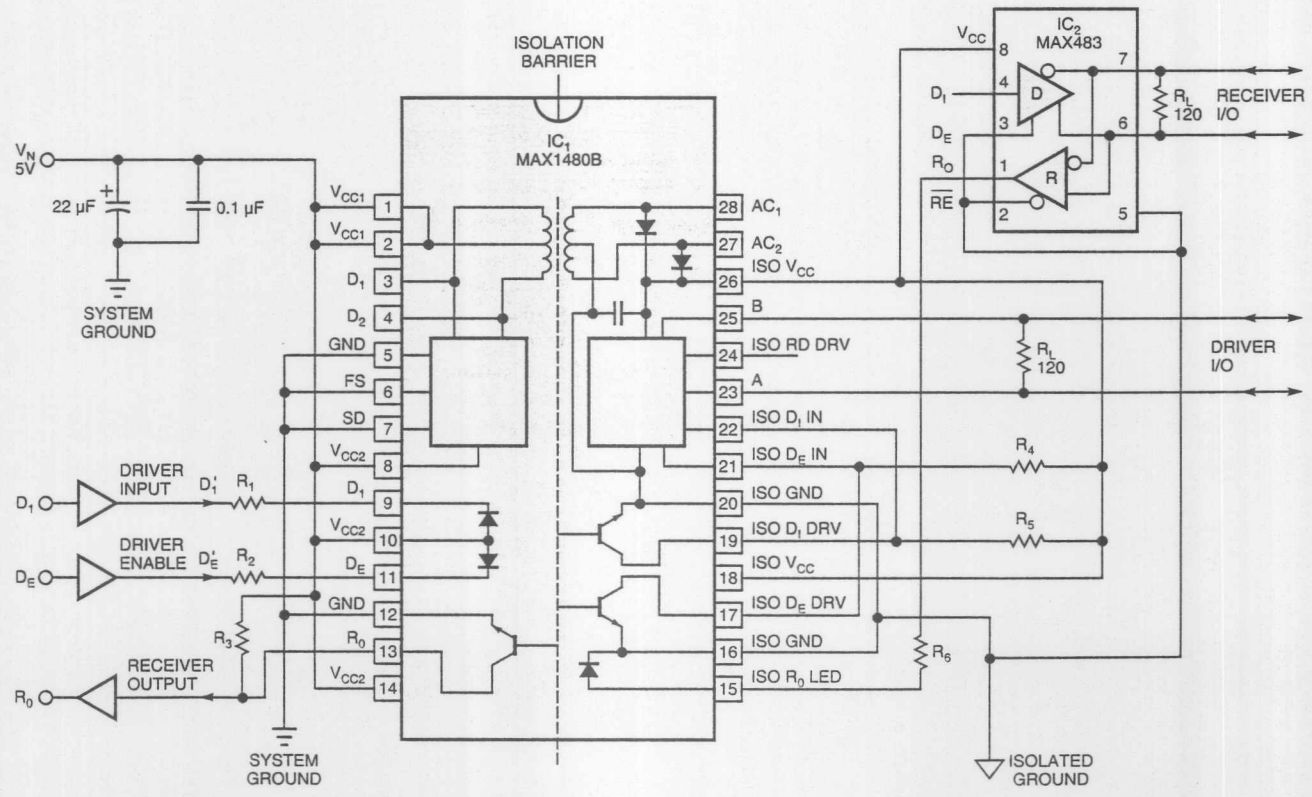
FIGURE 1



Adding IC_2 to a half-duplex, RS-485 transceiver enables full-duplex operation.